

UNIVERSITY OF CAMBRIDGE  
DEPARTMENT OF HISTORY AND PHILOSOPHY OF SCIENCE

FREE SCHOOL LANE  
CAMBRIDGE CB2 3RH  
TEL: CAMBRIDGE (0223) 334540  
FAX: CAMBRIDGE (0223) 334554

PROFESSOR MICHAEL REDHEAD FBA  
CHAIRMAN OF DEPARTMENT

1.3.95

Dear Alner,

I was very sorry we were not able to continue our discussions, after the unfortunate mishap with my back. It is slowly improving,

but I am still not able to give my lectures. However Pagonis and Dickson have nobly stood in for me, and their lectures seem proving quite a bit more popular with the students than my own!

It was very nice to see you again, and I hope you enjoyed your visit as much as we enjoyed having you.

I read through your 'theorem' that Jeremy passed on to me. I agree with everything you say. My condition  $\ast \forall P_2 \exists P_1$  s.t.  $\langle P_1, P_2 \rangle_{\overline{\Psi}} = \langle P_1, P_2 \rangle_{\Psi}$

is true iff  $\overline{\Psi}$  is entangled, and the Baby Reeh-Schlieder theorem follows iff  $\overline{\Psi}$  is entangled. So  $\ast$  is necessary and sufficient for  $P_{12}$

the Baby R-5 theorem.

This is what I claimed in 'More Ado--  
- sufficiency on p. 12, and necessity as  
Theorem 4 on p. 14.

The reason I proved Theorem 4 in such  
an apparently roundabout way was  
the following -

I could have argued simply that if  
 $\ast$  were false and hence  $\nexists$  not entangled,  
then the Baby R-5 theorem would be  
false. So, contrapositively Baby R-5  $\Rightarrow \ast$ .

But I wanted to give a 'direct' proof of  
 $\ast$ , ~~the~~ using only Baby R-5, which could  
then be lifted straight back to the  
field theory case, which was the one  
I was really interested in. This is,  
heuristically, how I hit on the idea that  
the vacuum correlations in the field theory  
case are maximal in the ~~ext~~ sense of  $\ast$   
(modulo suitable  $\epsilon$ silencies!)

My discussion of Baby R-5 in 'More Ado--'  
was really meant to explain to the  
reader how I came to think that the  
main result of the paper (Theorem 4 on p. 18)  
was a plausible story to try and prove!  
with very best wishes Michael